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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

DETAILED ACTION

1.   Claims 1-36 are pending.

Double Patenting

2.   A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

    A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer <u>cannot</u> overcome a double patenting rejection based upon 35 U.S.C. 101.

3.   Claims 1-14, 20, 21, 25, 28 and 29 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1, 12-24, 26, 27, 28, 30 and 31 of copending Application No.10/573,918. This is a statutory <u>provisional</u> double patenting rejection since the conflicting claims have not in fact been patented.

4.   Claims 1-11, 13, 14, 15, 20, 21, 30, 31, 25, 28, 29 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1, 10-19, 21, 22, 23, 26, 27, 28, 29, 30, 33, 34 of copending Application No.10/573,881. This is a statutory <u>provisional</u> double patenting rejection since the conflicting claims have not in fact been patented.

Drawings

5.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they

do not include the following reference sign(s) mentioned in the description:

>   i.   2012 on page 15, line 16;
>
>   ii.   2014 on page 16, line 15;
>
>   iii.   2022 on page 17, line 9;
>
>   iv.   2028 on page 17, line 12;
>
>   v.   2024 on page 17, line 21;
>
>   vi.   2026 on page 18, line 2;
>
>   vii.   207 on page 18, line 22;
>
>   viii.   403 on page 19, line 8; and
>
>   ix.   101 on page 36, line 1.

6.   Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to

the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. Each drawing sheet submitted after the filing date of

an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

Specification

7.   The disclosure is objected to because of the following informalities: please update the
status of the priority application with the updated status of the application (patent/publication
no).

        Appropriate correction is required.

8.   The disclosure is objected to because of the following informalities: the examiner notes
the use of acronyms (e.g. IDE, SCSI, etc.) throughout the specification without first including a
description in plain text, as required.

9.   The disclosure is objected to because it contains an embedded hyperlink and/or other
form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or
other form of browser-executable code. See MPEP § 608.01.

Claim Objections

10.   Claim 28 is objected to because of the following informalities:

        a.   Claim 28, line 2, please replace ";" with ":".

        Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
subject matter which the applicant regards as his invention.

11.   Claims 1-27, 30-36 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

      b.   The following terms lack antecedent basis:

            i.   Claim 36, line 1 -- said second virtual exception --

      a.   The following claim languages are unclear and indefinite:

            i.   As per claim 1, line 7 recites "providing modification" it is unclear what

constitutes providing modification.

            ii.   Claim 6, line 2 recites "virtual fashion" it is unclear what constitutes

virtual fashion (i.e. delayed interrupt operation? interrupt serviced in virtual

system? real interrupts are converted to virtual interrupts?).

            iii.   Claim 8, line 2 recites " notified as virtual exception" it is unclear what

constitutes virtual exception (i.e. translation the interrupts as virtual ? delaying the

interrupt service by storing in a virtual memory? Interrupts generated in virtual

memory address?).

            iv.   Claim 32, line 6 recites "virtual exception is created" it is unclear what

constitutes a virtual exception and how is that created (i.e. how is the virtual

exception different than other exception? it's the same as other exception?).

Claim Rejections - 35 USC § 102

      The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed
in the United States before the invention by the applicant for patent or (2) a patent granted on an application for
patent by another filed in the United States before the invention by the applicant for patent, except that an
international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this
subsection of an application filed in the United States only if the international application designated the United
States and was published under Article 21(2) of such treaty in the English language.

12.   Claims 1-12, 15-22, 25-36 are rejected under 35 U.S.C. 102(e) as being anticipated by

Ohno et al.(US Patent No. 6,715, 016).

13.   As per claim 1, Ohno teaches the invention as claimed including a method of enabling

multiple different operating systems to run concurrently on the same computer (figure 1),

comprising:

selecting a first operating system to have a relatively high priority (col 3, lines 53-55; OS-

B);

selecting at least one second operating system to have a relatively lower priority (col 3,

lines 39-42; lines 53-57; OS-A);

providing a common program arranged to switch between said operating systems under

predetermined conditions (col 3, lines 59-65); and

providing modifications to said first and second operating systems to allow them to be

controlled by said common program (col 1, lines 64-67 through col 2, lines 1-19).

14.   As per claim 2, Ohno teaches in which the first operating system is a real time operating

system (col 3, lines 53-55).

15.   As per claim 3, Ohno teaches in which the second operating system is a non-real time,

general-purpose operating system (col 3, lines 39-42).

16.   As per claim 4, Ohno teaches in which the second operating system is Linux, or a version
or variant thereof (col 3, lines 39-42).

17.   As per claim 5, Ohno teaches in which the common program is arranged to save, and to
restore from a saved version, the processor state required to switch between the operating
systems (col 2, lines 4-11).

18.   As per claim 6, Ohno teaches in which processor exceptions for the second operating
system are handled in virtual fashion by the common program (col 8, lines 41-45).

19.   As per claim 7, Ohno teaches in which the common program is arranged to intercept
some processor exceptions, and to call exception handling routines of the first operating system
to service them (col 7, lines 21-41).

20.   As per claim 8, Ohno teaches in which the processor exceptions for the second operating
system are notified as virtual exceptions (col 8, lines 33-49).

21.   As per claim 9, Ohno teaches in which the common program is arranged to call an
exception handling routine of the second operating system corresponding to a said virtual
exception which is pending (col 8, lines 33-49).

22.   As per claim 10, Ohno teaches further comprising providing each of said operating

systems with separate memory spaces in which each can exclusively operate (col 4, lines 65-67

through col 5, lines 1-2).

23.   As per claim 11, Ohno teaches further comprising providing each of said operating

systems with first input and/or output devices of said computer to which each has exclusive

access (col 3, lines 24-28; col 4, lines 38-46).

24.   As per claim 12, Ohno teaches in which each operating system accesses said first input

and/or output devices using substantially unmodified native routines (col 4, lines 58-64).

25.   As per claim 15, Ohno teaches providing a restart routine for restarting a said second

operating systems without interrupting operation of said first, or said common program (col 2,

lines 4-11).

26.   As per claim 16, Ohno teaches in which the common program provides trap call

mechanisms, to control the operation of the second operating system, and/or event mechanisms

to notify the first operating system of status changes in the second operating system (col 7, lines

55-60).

27.   As per claim 17, Ohno teaches in which the common program stores a copy of the system
image of the kernel of the second operating system, and is arranged to restore the kernel of the
second operating system from such a saved copy (col 2, lines 4-11).

28.   As per claim 18, Ohno teaches in which the first and second operating systems have
cooperating routines to enable the first operating system to monitor the continued operation of
the second operating system, to allow the detection of a crash of the second operating system
(col 2, lines 12-19; col 3, lines 10-14).

29.   As per claim 19, Ohno teaches providing a debug routine, in which the common program
is arranged to output the states of machine state variables on occurrence of predefined conditions
in the operation of said operating systems (col 7, lines 20-67 through col 8, lines 1-19).

30.   As per claim 20, Ohno teaches combining said operating systems and common program
into a single code product (col 1, lines 64-67 through col 2, lines 1-4).

31.   As per claim 21, Ohno teaches embedding said operating systems and common program
onto persistent memory on a computer product (col 2, lines 20-23).

32.   As per claim 22, Ohno teaches in which the common program is arranged to provide an
inter-operating system communications mechanism allowing communications between said first
and second operating systems, and/or applications running on them (col 3, lines 59-61).

33.   As per claim 25, Ohno teaches a development kit computer program product comprising

code for performing the steps of claim 1 (col 2, lines 20-23).

34.   As per claim 26, Ohno teaches a computer program product comprising code combined

according to claim 20 (col 1, lines 64-67 through col 2, lines 1-4).

35.   As per claim 27, Ohno teaches an embedded computer system comprising a CPU,

memory devices and input/output devices, having stored on persistent memory therein programs

embedded according to claim 24 (col 2, lines 57-65).

36.   As per claim 28, Ohno teaches the invention as claimed including a computer system

comprising a CPU, memory devices and input/output devices (col 2, lines 57-65; figure 1),

having executing thereon computer code comprising;

        a first operating system having a relatively high priority (col 3, lines 53-55);

        a second operating system having a relatively lower priority (col 3, lines 39-42; lines 53-

57); and

        a common program arranged to run said operating systems concurrently by switching

between said operating systems under predetermined conditions (col 3, lines 59-65).

37.   As per claim 29, Ohno teaches a computer system according to claim 28, arranged to run

said first and second operating systems concurrently (col 3, lines 39-52).

38.   As per claim 30, Ohno teaches in which each said operating system is provided with an

idle routine, in which it passes control to the common program (col 3, lines 59-67 through col 4,

lines 1-14).

39.   As per claim 31, Ohno teaches in which said idle routine substitutes for a processor halt

instruction (col 3, lines 59-67 through col 4, lines 1-14).

40.   As per claim 32, Ohno teaches in which, on occurrence of processor exception during

execution of an executing operating system, (a) the common program is arranged to call

exception handling routines of the first operating system to service them (col 7, lines 29-41);

       (b) if the exception was intended for a predetermined second operating system, a virtual

exception is created (col 7, lines 29-41; col 8, lines 40-49);

       (c) after the processor exception has been serviced by the first operating system, the

common program is arranged to return to execution of the executing operating system (col 3,

lines 47-52);

       (d) when the common program next switches to the predetermined second operating

system, the virtual exception which is pending is notified to the predetermined second operating

system (col 7, lines 55-60; col 8, lines 41-49); and

       an exception handling routine of the predetermined second operating system

corresponding to the said virtual exception is called to service it (col 8, lines 41-49).

41.   As per claim 33, Ohno teaches in which the second operating system is modified to
prevent it masking interrupts (col 7, lines 21-54).

42.   As per clam 34, Ohno teaches in which all hardware interrupts are initially handled by the
first operating system, and those intended for a second operating system are virtualised and
deferred until that second operating system is next scheduled by the common program, and are
serviced by that second operating system at that time (col 7, lines 29-41).

43.   As per claim 35, Ohno teaches in which the common program is arranged to provide a
means for the or each secondary operating system to mask virtual exceptions to replace the
hardware interrupt masking code in the secondary operating system to make the secondary
system fully preemptable by the primary system (col 7, lines 21-41).

44.   As per claim 36, Ohno teaches in which said second virtual exception is not masked (col
8, lines 55-65).

Claim Rejections - 35 USC § 103

45.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

46.   Claims 13-14 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Ohno et al.(US Patent No. 6,715, 016), in view of Endo et al.(US Patent No. 6,615,303).

47.   As per claim 13, Ohno do not specifically disclose providing each of said operating

systems with access to second input and/or output devices of said computer to which each has

shared access (figure 11, element 192).

        However Endo teaches providing each of said operating systems with access to second

input and/or output devices of said computer to which each has shared access (figure 11, element

192).

48.   It would have been obvious to a person of ordinary skill in art at the time of invention

was made to incorporate the teaching of Ohno into the method of Endo to have each operating

system having access to input/output devices that has shared access. The modification would

have been obvious because one of the ordinary skills of the art would be motivated to utilize the

teaching of Endo to have devices with shared access with multiple operating system to be able

utilize all the functions of the hardware device.

49.   As per claim 14, Endo teaches in which all operating systems access said second input

and/or output devices using the routines of the first operating system (col 12, lines 63-67).

50.   As per claim 23, Endo teaches in which the common program defines virtual input and/or

output devices corresponding to communications bus bridges, so that said operating systems can

communicate as if by a communications bus (figure 19; col 17, lines 55-67 through col 18, lines 1-3).

51.   As per claim 24, Endo teaches in which the step of modifying said operating systems comprises adding driver routines managing said virtual bus bridge devices (figure 19; figure 19; col 17, lines 55-67 through col 18, lines 1-3).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ABDULLAH AL KAWSAR whose telephone number is (571)270-3169. The examiner can normally be reached on Monday to Thursday between 8:00am to 6:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng Ai T. An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 **(IN USA OR CANADA)** or 571-272-1000.

/Meng-Ai An/   /Abdullah-Al Kawsar/
Supervisory Patent Examiner, Art Unit 2195   Examiner, Art Unit 2195